# MA CHPS Energy Savings Analysis

| | Cost * * | Energy Savings | Pay Back |
|---|---|---|---|
| **MA CHPS Baseline** ASHRAE Standard 90.1-2007/IECC 2009 | - | - | - |
| **MA Stretch Code** | $0.5m | 20% | 4.5 years |
| **Design System *** | $1.1m | 42.4% | 5.1 years |
| **Design System with 200 kw PV System** | $1.9m | 47% | 7.9 years |
| **Design System with 500 kw PV System** | $3.1m | 53.9% | 11.1 years |
| **Design System with 1000 kw PV System** | $5.1m | 65.5% | 15.0 years |
| **Design System with 1800 kw PV System** (Architecture 2015) | $8.3m | 88.3% | 18.4 years |
| **Design System with 2000 kw PV System** (Architecture 2030/Net Zero) | $15.5m | 130.5% | 22.7 years |

* Designed System:

1. Displacement Ventilation Diffusers w/ Terminal VAV's and Perimeter Hot Water Radiant Panels served by Hot Water Coil Heating/Chilled Water Coil Cooling 100% O.A. Ventilating Units w/ Energy Recovery
2. Hot Water Coil Heating/Chilled Water Coil Cooling AHU's w/ Terminal VAV's w/ Hot Water Reheat Coils
3. High-Efficiency Water Cooled Chillers
4. High-Efficiency Gas-Fired Condensing Boilers
5. High-Efficiency Lighting Fixtures w/ Daylighting Controls (0.3 w/s.f.)
6. Improved Envelope: Roof Insulation (R-40 c.i.), Wall Insulation (R-19 + R-15 c.i.), Double Pane Argon Filled Window Assembly w/ Heat Mirror Film (U-0.2, SHGC 0.4)

* * Note: Construction cost is the investment increase above the construction of a code/ASHRAE Standard 90.1.2007 baseline Building